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PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

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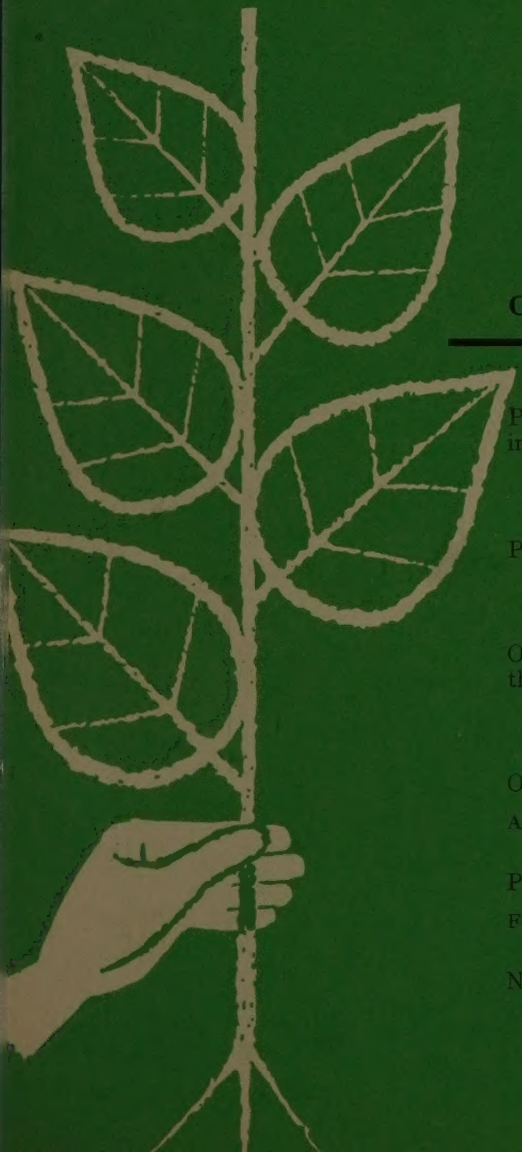

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20 SEP 1960

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FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

Entomology

Preliminary Report on the Boang Disease of Coconut in Mindanao, the Philippines

Bernardo S. Castillo, Bureau of Plant Industry, Manila, and
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In 1954 the Philippine Bureau of Plant Industry in Manila received a complaint about a presumably new disease of coconuts, called "boang" disease, which was observed at the Matute Plantation in Tiblawan, Governor Generoso, Davao Province, Mindanao. Tiblawan Plantation stretches along the coast of the Davao Gulf, covering about 7 kilometers toward the steep mountain ranges. Coconut trees were first planted there in 1920 and a total area of 363 hectares was covered by 1925. The plantation is isolated and difficult to reach. The only communication with other localities is by boat, because the densely wooded mountains beyond the narrow strip of cultivated land along the beaches are impenetrable and unexplored.

A party headed by the senior author studied the disease situation in the Matute Plantation for five days in 1954. Some of the data concerning the history of the plantation, symptoms, and possible causes, discussed in detail in his unpublished report to the government [1] have been incorporated in the present paper.

In 1957 the plantation was revisited by the senior author accompanied by Dr. W. C. Price, then serving as FAO Plant Virologist in the Philippines. A complete study of the causes and possible means of prevention was recommended and, as a result, two men were assigned to Tiblawan by the Bureau of Plant Industry. Unfortunately, both were recalled shortly afterward, because of a lack of recognition on the importance of the investigation. At that time the disease was believed to be limited to a single plantation in Tiblawan.

The present paper is based largely on the result of a third visit to Tiblawan in March 1960. The authors left Davao by car in the early morning and reached the end of the surfaced road four hours later near La Union. Changing to outrigger canoes with outboard motors, they went to La Union, then to Montserrat, and finally arrived at Tiblawan in the late afternoon. At the time of the third visit, the plantation was about 30 to 35 years old.

Extent of damage

"Boang" in the Bohol language means empty, and the name refers to coconuts without useful contents. The disease has also been called "crazy nuts," because of the peculiar distortions and very light weight of fairly large nuts. In 1954, boang attacked an estimated 3,500 of 16,000 trees in the most severely affected block of the Tiblawan Plantation. In 1960 the estimated number of diseased trees in the same block was 7,000. It should be added that in this estimate only trees with visibly distorted or completely spoiled nuts were considered as diseased. Partially damaged nuts with initial symptoms of boang were not included, because from a practical viewpoint such trees yielded nuts with normal

[1] CASTILLO, B.S. 1954. *A report of the "boang" disease of coconut in Matute Coconut Plantation, Tiblawan, Governor Generoso, Davao Province.* Typewritten, submitted to the Bureau of Plant Industry, 6 April 1954.

copra. If trees bearing but one damaged nut had been counted as diseased, and if the early stages of boang could have been observed without the splitting of suspected nuts, the number of trees with boang probably would be more, nearly 90 percent of the total. This estimate is based on the finding that many nuts collected during the survey from so-called healthy trees were found to have early symptoms of the disease.

It was noted in the 1954 survey at Tiblawan that the total number of so-called healthy nuts from a diseased tree was only about 40 percent. Furthermore, the average number of pollinated and developed buttons on boang-affected trees was below 20 percent, compared to an average of 35-42 percent of female flowers reaching maturity on normal trees.

Description of diseased nuts

Most typical boang nuts are either completely empty (Figure 1) or very small. The development of the husk is often normal; the shell is very thick, hard, strong and very much reduced, forming pigmy-sized nuts. The kernel is either completely absent or, when partially developed, has globular protuberances. In some distorted nuts the shell is rudimentary. Some others have a trace of copra left and they show cracks at the apical end of the nut. In still others there is a complete shell, with the exception of about one fourth that is destroyed and absent. Some nuts of this type contain fermented "water," while in others the water is absent. The shell (or meat) is thinner than normal and of a soft, spongy consistency. The so-called healthy nuts from diseased trees have a normal shape and the shell appears normal, except for a tiny indentation or missing part, sometimes as small as a pinhead, but occasionally 1 centimeter in diameter or larger. The shell of a diseased nut is thin, soft, with an uneven surface and easily attacked by bacteria or fungi. The copra from boang nuts is brownish and it deteriorates further during the drying process.

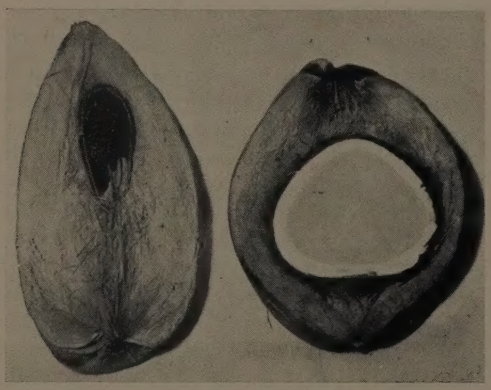

Figure 1. A typical coconut affected by boang which appears oblong is completely empty. A healthy nut on the right.

All nuts from the boang-affected trees that were inspected showed a characteristic channel extending from the inside of the nut outward. In badly diseased nuts, this channel caused a splitting of the fruit and this seemed to have accounted for the drying out of the water.

Probable cause

The cause of boang has not yet been experimentally determined and the following is being presented as a working hypothesis. The differences in the appearance of fermented nuts, particularly the multicolored bacterial colonies, seemed to indicate that bacteria and fungi were but secondary invaders of the boang nuts. The tiny channel which was found in almost every distorted nut and in some nuts that at first were believed to be healthy, might serve as the point of entry for various bacteria and fungi. It appeared likely that a small insect caused the damage and that its eggs were being deposited in the buttons at the time of pollination. Many buttons failed to develop and became abortive, so that the number of developing nuts was much reduced. A toxic substance could have been secreted by the developing larva and might have caused the distortion of the affected nuts (Figure 2). Afterward, the larva or perhaps the adult insect bored the narrow channel leading outward, through which it emerged. If this occurred late in the development of a nut, invasion of microorganisms could cause fermenta-

Figure 2. A coconut affected by boang, showing the distorted shape and enlarged size, accompanied by a partial destruction of the shell.

tion of the water but not necessarily destruction of the copra. Earlier emergence of the causal insect could permit longer action of secondary invaders, resulting in complete spoilage of the interior of the nuts. This hypothesis was supported by the finding that in many healthy-appearing nuts, the shell was normal, except for a very small area surrounding the inner end of the tiny channel (Figure 3).

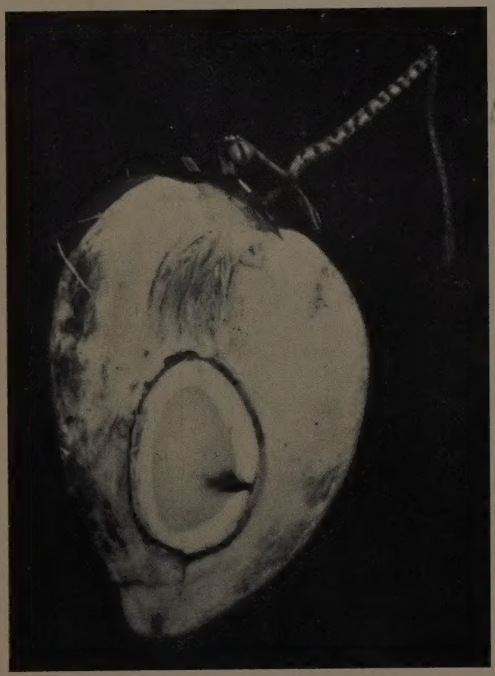

Figure 3. A healthy-appearing coconut affected by boang with the shell almost normal, except for a small area which is destroyed.

Comparison between boang and coconut deformations in other areas

Although until 1960 the boang disease was believed to be confined to Tiblawan, smaller outbreaks are now known to occur along the Gulf of Davao and even at plantations located at considerable distances from Tiblawan, for example, the Mount Apo Plantation on the opposite side of the Davao Gulf.

Enquiries made in other areas of the Philippines disclosed that boang-like nuts are known to occur sporadically in almost every region where coconuts are grown, although very little attention has been given to such distorted nuts in view of their relatively rare occurrence. The reasons for the extremely high rate of incidence of boang in Tiblawan, Mindanao, are still unexplained. So far as is known, the outbreak in Mindanao is unique in only one respect — the very high percentage of affected nuts. Similar distortions have also been described from other coconut-growing regions, such as the West Indies and India, but the number of affected nuts apparently has never been higher than 3 percent. In India, empty nuts have been observed for many years but have not been considered as a manifestation of a disease or as a result of the attack of an insect pest. According to Menon and Pandalai (5, p. 79), in some coconut plantations trees produced a large number of so-called "barren nuts." The morphology of these nuts is the same as of the boang-affected coconuts of Mindanao. They are oblong in shape, while the normal nuts are roundish. The embryo in the barren nuts is mostly absent or, when present, it is in varying stages of decay. Often the shell and kernel are improperly developed and bacteria and fungi infect the embryo, causing decay and loss of water from the inside.

A survey of the literature shows that the earliest published report of "barren nuts" was

made by Kupfer (4) in 1901. In 1907 Bartlet and Belling (1) described similar nuts from Barbados. In 1924 Furtado (2) expressed the belief that defective pollination caused the disorder. Nutritional deficiency had also been considered as a possible cause. More recently, excessive bearing was suspected to cause the disorder. The last hypothesis was based on observations in India (3), where artificial retention of buttons by means of hormone spraying resulted in a larger production of barren nuts. This observation might well be explained on a different basis. In India no early abortions of distorted buds have been reported, and the earliest changes were noticed in four-month-old nuts. In Mindanao abortive nuts were fairly common, probably because the disorder is more widespread. The artificial retention of such nuts by means of hormones could result in the relative increase or a "larger proportion" of defective nuts.

In 1954 Castillo [2] noticed the presence of several species of insects affecting the pollination of buttons. He expressed the view that the occurrence of large numbers of diseased nuts on boang trees could be attributed to the role of insects as vectors of bacteria or fungus spores at the time of pollination.

Larvae of an unidentified brown coleopterous insect, resembling the banana corm weevil (*Cosmopolites sordidus*), but somewhat smaller, were found boring inside the spikelets. There were cases where the tunnels extended to the attachment of the nut, causing premature abscission.

The present study revealed that in all examined nuts from affected trees, and in a few nuts considered to be healthy, one tiny channel was present in each nut. This supports the conclusion that boang nuts are the result of insect injury, inflicted shortly after, or during the pollination of the buttons. If this hypothesis should be confirmed by further studies, the prevention of boang by frequent spraying of insecticides should be feasible. The suspected insect may be most abundant at certain times of the year, which would explain the large number of boang nuts formed during certain months, for instance, during April in India.

[2] *Loc. cit.*

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2. Furtado, C.X. 1924. A study of the coconut flower and its relation to fruit production. *Garden's Bull. Straits Settlement* 3 : 261-274.
3. Indian Central Coconut Committee. 1959. *Annual report of the Central Coconut Research Station (Kasangorod) for 1957-1958.*
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Plant Diseases in the British Colonial Dependencies[1]

J.C.F. Hopkins, Commonwealth Mycological Institute, Kew, England

Africa

KENYA

Messrs. I.A.S. Gibson and N.A. Goodchild have investigated root rot in tea caused by *Armillaria mellea* and have found that the disease is not spread by air-borne spores as has been stated, that the strain of *A. mellea* in the tea district of Kericho is not more virulent than elsewhere, and that the control method of ring-barking trees before felling, described by Leach,[2] in order to exhaust the starch reserves in the roots prior to death is effective in suppressing the pathogen, provided the work is done efficiently. They also found that there is a natural association between *A. mellea* and the roots of healthy tea and indigenous forest trees, and as long as the natural balance is maintained, the fungus does not become parasitic.

MAURITIUS

Proclamation No. 17 of 1959 introduced a number of new legislative restrictions, mainly to control the importation of living plants and soil and to afford protection against certain specific diseases. This was done in conformity with the recommendations of the Inter-African Phytosanitary Commission for all territories in Africa South of the Sahara.

The following diseases of economic importance were newly recorded: *Mycosphaerella musicola* and *Cordana musae* on banana (the degree of susceptibility of the dwarf banana, the chief commercial variety, is not yet known); downy mildew of cucumber, *Pseudoperonospora cubensis*; leaf spot of groundnuts, *Mycosphaerella arachidicola*; leaf spot of *Phaseolus*, *Cercospora canescens*, causing considerable damage.

ZANZIBAR

Dr. B.E.J. Wheeler of the Colonial Pool of Plant Pathologists has confirmed that wither tip of limes is the chief cause of failure of the crop in the island and has shown that economical control may be obtained by the use of phenyl mercury nitrate sprays. Captan also proved successful but was too expensive, and seven other fungicides were ineffective. The question of possible toxic residues is being investigated.

Caribbean

BRITISH HONDURAS

Cushion gall of cocoa has now been reported and material has been collected and sent to the Commonwealth Mycological Institute, Kew, where a comparative investigation is being made of the disease as it occurs in South America, Trinidad and West Africa. Although the cause is not yet ascertained, the disease has been transmitted by mechanical inoculation by pathologists in West Africa, and what is thought to be an infective agent has been isolated at Kew. Co-operative investigations are proceeding.

Asia

SARAWAK

Mr. P. Holliday of the Colonial Pool of Plant Pathologists, who has been investigating the foot rot of *Piper nigrum* for several years, has shown that the cultivar grown in Sarawak is highly susceptible to the *Phytophthora* pathogen, as yet unnamed.

Cultivars introduced from Indonesia have proved to be resistant, while those from India are intermediate. Contrary to general belief, young plants have proved to be as susceptible as those more mature, while cuprous oxide drenches have checked the spread of the disease in established gardens.

A new virus disease of black pepper, termed "pepper stunt," has been transmitted from infected to healthy plants by approach grafting. Besides causing a mosaic type of mottling and stunting of the vines, the disease also reduces the crop considerably.[3]

BRITISH SOLOMON ISLANDS

Puccinia polysora was reported in 1959 on maize for the first time. It occurred in widely separated localities and is thought to have been present for some time. Other diseases of importance newly recorded are *Cercospora fuliginea*, causing a brown mold on tomato leaves; *Elsinoe fawcettii* on citrus; and *Cercospora koepkii* and *Glomerella tucumanensis* on sugar cane.

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[1] This report covers the period from 1 July 1958 to 31 December 1959.

[2] LEACH, R. 1937. Observations on the parasitism and control of *Armillaria mellea*. *Proc. Roy. Soc. Ser. B.* 121: 561-573.

[3] HOLLIDAY, P. 1959. Suspected virus in black pepper. *Commonw. Phytopath. News* 5: 49-52.

Observations on Nematodes in the Roots of Plants in the Sudan

Heinz Decker and El-Tigani Mohamed El-Amin, Institut für Phytopathologie und Pflanzenschutz, Universität Rostock, Germany

In recent years, intensive studies of parasitic nemotodes have been carried out in many countries, especially because of their importance as the causes of plant diseases. The results appear to indicate that most species of parasitic nematodes have a limited distribution and only a few are of universal occurrence. However, definite opinions on the distribution and spread of nematode species cannot be formed at the present time, as there are still many countries and territories in which investigations on free-living and migratory nematodes have not yet been initiated.

In order to gain some knowledge on nematodes parasitic to roots of plants in the Sudan, root samples were taken by the junior author in January 1959 from some parts of the country. The samples were taken mostly from crops during their maturing stage and were fixed in the FAA fixative as given by s'Jacob and Stemerding,[1] consisting of alcohol (96 percent) 100 cc., formalin (40 percent) 30 cc., acetic acid 5 cc., and distilled water 200 cc. The identification was made at the Institut für Phytopathologie und Pflanzenschutz der Universtät Rostock. The present paper summarizes briefly the results of this investigation.

Climatic and soil conditions

The Sudan has a continental tropical climate. Most of the country is within the region of summer rainfall, which diminishes from south to north. The annual rainfall and mean daily maximum and minimum temperatures recorded at Wad Medani and Khartoum, as given by Ferguson,[2] are summarized in Table 1.

[1] s'Jacob, J. J. and S. Stemerding. 1956. Een handleiding voor nematologie. *Plantenziektenkundige Dienst*, Wageningen, Overdruk 120.

[2] Ferguson, H. 1954. Food crops of the Sudan and their relation to environment. *Mem. Res. Div. Min. Agr. Sudan* 36.

Table 1. — Rainfall and mean daily temperatures at Wad Medani and Khartoum, the Sudan

Station	Annual rainfall, in millimeters	Mean daily temperatures, in degrees centigrade			
		Yearly average		Range of monthly averages	
		Maximum	Minimum	Maximum	Minimum
Wad Medani	370	37	20	34–41	14–24
Khartoum	181	38	22	32–42	15–26

All root samples were collected from three areas, namely, Gezira, Toti and Shambat. The Gezira, in which Wad Medani is located, is the most important irrigated clay area in the Sudan, with free flow irrigation supplied by the Sennar dam. At Toti and Shambat, which are near Khartoum, the soil is also clay and lift irrigation is practiced.

Nematode species observed

The investigation yielded 11 species of nematodes from roots of 14 crops. The names of nematode species and their hosts are listed below. The names in brackets are the arabic names of the plants.

1. *Pratylenchus* sp.
   - *Allium cepa* (Basl) — Shambat
   - *Gossypium* sp. (Qutn) — Gezira
   - *Medicago sativa* (Bersim el hegaz) — Gezira, Shambat
   - *Phaseolus vulgaris* (Fasulia) — Gezira, Shambat
   - *Solanum melongena* (Bedingan) — Gezira
   - *Trifolium* sp. (Bersim) — Gezira
   - *Vicia faba* (Ful masri) — Shambat
2. *Aphelenchus avenae* Bastian, 1865
   - *Allium cepa* — Shambat
   - *Citrus sinensis* (Bortuqan) — Shambat

	Gossypium sp.	Gezira
	Medicago sativa	Shambat
	Phaseolus vulgaris	Gezira
	Psidium guajava (Gawafa)	Shambat
	Triticum aestivum (Qamh)	Gezira
3.	*Tylenchus* sp.	
	Lycopersicum esculentum (Tematim)	Toti
	Solanum melongena	Gezira
4.	*Eucephalobus elongatus* (de Man, 1880) Thorne, 1937	
	Gossypium sp.	Gezira
	Medicago sativa	Shambat
5.	*Eucephalobus striatus* (Bastian, 1865) Thorne, 1937	
	Punica granatum (Roman)	Shambat
6.	*Cephalobus nanus* de Man, 1886	
	Citrus sinensis	Shambat
7.	*Cephalobus* sp.	
	Pennisetum typhoides (Dukhn)	Gezira
8.	*Acrobeloides* sp.	
	Allium cepa	Shambat
	Trifolium sp.	Gezira
	Triticum aestivum	Gezira
9.	*Dorylaimus filiformis* Bastian, 1865	
	Medicago sativa	Shambat
10.	*Dorylaimus* sp.	
	Medicago sativa	Shambat
11.	*Rhabditis* spp.	
	Cucumis sativus (Khiyar)	Gezira
	Gossypium sp.	Gezira
	Lycopersicum esculentum	Toti
	Triticum aestivum	Gezira

Among the 25 plant species from which samples were taken, 14 species were found to be affected by nematodes. Alfalfa (*Medicago sativa*) roots appeared to harbor the largest number of species of nematodes, being followed by cotton (*Gossypium* sp.), onion (*Allium cepa*) and wheat (*Triticum aestivum*).

Among the nematode species observed, *Aphelenchus avenae* (Figure 1) appeared most frequently, followed by *Pratylenchus* sp. (Figure 2).

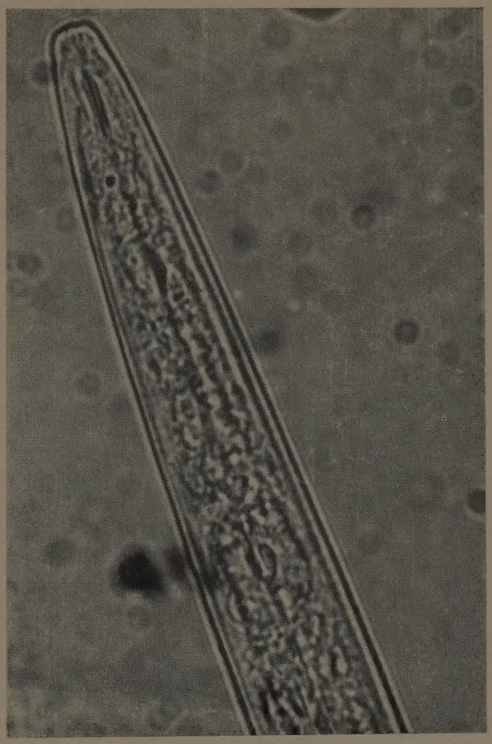

Figure 1. Pratylenchus sp. found in the Sudan, view of anterior part. X 750.

Both species were found in roots of seven plant species. *Acrobeloides* sp. (Figure 3) also belongs to the dominant species observed, being found in three plant species.

The total number of nematodes observed was rather small, because of the minor quantity of root samples available. The populations noticed were equally small. Only in the onion roots from Shambat, more than 100 larvae and adults of *Pratylenchus*, *Aphelenchus* and *Acrobeloides*, and more than 2,000 eggs were found in 7 grams of the root sample.

Because of the limited material available for study, conclusions cannot, of course, be reached as to the occurrence and relative prevalence of nematode species in the Sudan. However, the results reported herein would provide a basis for future investigations.

Figure 2. Aphelenchus avenae found in the Sudan, view of anterior part. X 750.

Plants without nematodes in roots

Among the 25 plant species examined, the following 11 species were found to be free from nematodes in their roots.

Carthamus tinctorius (Gurtum)	Gezira
Citrus paradisi (Narang)	Shambat
Corchorus olitorius (Melukhiya)	Shambat
Dolichos lablab (Lubia afin)	Shambat
Foeniculum vulgare (Shamar)	Shambat
Hibiscus sabdariffa (Kerkade)	Toti
Linum usitatissimum (Kittan)	Shambat
Lupinus termis (Termis)	Gezira
Portulaca oleracea (Rigla)	Shambat
Sorghum sp. (Dura)	Gezira
Trifolium alexandrinum (Barsim masri)	Shambat

Figure 3. Acrobeloides sp. found in the Sudan, showing eggs in the roots of onion before hatching. X 480.

OUTBREAKS AND NEW RECORDS

ARGENTINA

José B. Goldberg and Alejo von der Pahlen,
Instituto de Fitotecnia, Castelar

Occurrence of two pea diseases

BACTERIAL BLIGHT

In October 1958, a bacterial disease of peas (*Pisium sativum*) that had not been recorded previously in Argentina, was found simultaneously in Castelar and Ramallo in the Province of Buenos Aires. Symptoms were identical with those of bacterial blight and the pathogen was isolated and identified as *Pseudomonas pisi* Sackett. Characteristic disease symptoms were reproduced on healthy plants through inoculation.

In Castelar it was observed that the disease incidence was higher on dwarf pea varieties than on climbing peas. On dwarf varieties about 30 percent of the aerial parts were affected, whereas on climbing peas only 5 to 10 percent showed lesions.

In 1959 the disease was more severe than the previous year, especially in Ramallo, where dwarf pea varieties were grown exclusively.

SEPTORIA BLOTCH

This disease caused by *Septoria pisi* West. was not known to occur in Argentina until it was reported and identified in 1958 on the Holandesa pea variety grown in the Ramallo area. Only light attacks were observed in that year but in 1959 it became more severe, as much as 30 percent of the surface of the leaves, stems and pods being affected by lesions.

FEDERATION OF RHODESIA AND NYASALAND

J.A. Whellan, Entomological Branch,
Federal Ministry of Agriculture, Salisbury

Insect incidence in 1959

The most important development in pest incidence in the Federation for several years was undoubtedly the discovery of pink bollworm, *Platyedra gossypiella,* of cotton in the lower Sabi Valley in late May 1959. Subsequently, extensive investigations on this pest have been carried out, and it seems that so far its distribution is restricted to the small cotton-growing area in this region. Furthermore, samples were taken throughout the latter half of 1959 to ascertain whether long diapause larva developed. No evidence of such larvae was found, and this is surprising in view of the fact that the area concerned is south of 20° south of the equator. It is thought that the pest has succeeded in maintaining itself during the winter by breeding in the bolls of *Hibiscus dongolensis,* in which it has been found quite plentifully. The mode of origin of pink bollworm in this area is rather difficult to assess as, although it is known to occur in Mozambique, the known areas of its distribution there are remote from the present locus of infestation. On the other hand, in view of its incidence in *H. dongolensis,* it is possible that it has occurred in low density in the area, breeding mainly on this plant

for a considerable number of years, and that it has only been detected with the increased attention being paid to cotton growing in the region in the last two or three years.

Gossypium herbaceum is also present in the area but has not so far been found to be infested. The only previous record of the occurrence of pink bollworm in the Federation was in Nyasaland in the early 1930s, and it appears to have died out there at that time and intensive search in recent years has failed to disclose it.

INDIA

D. Bap Reddy, Directorate of Plant Protection, Quarantine and Storage, New Delhi

New disease records

Onion smut caused by *Urocystis cepulae* Frost was observed for the first time in July 1958 near Melur, Kolar District, Mysore State, on onion seedlings approximately one month old. In August 1959 it appeared again in some onion and garlic fields. A preliminary survey made in March 1960 revealed the presence of the disease on onions in Chennarayapatna, Bangalore District, Mysore State. So far, this disease is not known to occur in any other part of India.

Heterosporium blight caused by *Heterosporium allii-cepae* Ranoj. was first recorded in June 1957 on onion at the Provincial Agricultural Research Farm, Shalimar, Kashmir. It infects the leaves and flower stems of autumn-sown onion grown for seed production.

Twist disease caused by *Dilophospora alopecuri* (Fr.) Fr. was observed on wheat in April 1959 at two places in the Kashmir Valley. The incidence of the disease was rather heavy during the early stage but it had no appreciable effect on yield. This disease is known to be of little economic importance.

PLANT QUARANTINE ANNOUNCEMENTS

FEDERATION OF RHODESIA AND NYASALAND

Plant Pests and Diseases (Importation) (Amendment) Regulations, 1959 (No. 1), published in the *Supplement to the Federal Government Gazette* on 16 October 1959, modify the Plant Pests and Diseases (Importation) Regulations, 1958 (see *FAO Plant Prot. Bull.* 7: 55-60. 1959) in the following aspects:

Ports of entry

Fort Jameson and Mohambo of Northern Rhodesia and Detza and Mabosa of Nyasaland are added to the list of points of entry.

Coffee seed

The importation of coffee seed from any source now requires an import permit issued by the Secretary to the Ministry of Agriculture. Previously the permit was required only for coffee seed from non-Convention countries from territories the governments of which are not parties to the Phytosanitary Convention for Africa South of the Sahara.

Citrus fruits

Citrus fruits and fresh and dried citrus peel (excluding candied peel) may now be imported from any territory where citrus black spot (*Guignardia citricarpa*) or citrus canker (*Xanthomonas citri*) is not known to exist. Previously such materials from all territories other than the Cape Province, Portuguese East Africa and the British East African territories were prohibited.

The importation of citrus fruits from sources not specifically prohibited are subject to the submission of a permit and of a certificate with additional declarations, indicating that citrus black spot and citrus canker do not occur in the territory of origin, and that the fruits have been fumigated before dispatch with methyl bromide or other fumigant in a manner to ensure the destruction of scale insects (Coccidae).

MEXICO

Exterior Quarantine No. 16, established by Executive Decree of the Ministry of Agriculture and Livestock on 1 October 1959, and published in the *Diario Oficial* Vol. 236, No. 34 on 10 October 1959, prohibits the importation of coconut (*Cocus nucifera*) plants in order to prevent the introduction of coconut virus diseases. Importation from any country of coconut plants, coconuts and products deriving from coconut palms, such as copra and fibers, is prohibited, except when the introduction is made for research and scientific purposes, under special permit of, and through the Office of Plant Protection.

NEWS AND NOTES

WORLD FORESTRY CONGRESS

The Fifth World Forestry Congress will be held at the University of Washington, Seattle, Washington, U.S.A., from 29 August to 10 September 1960. The United States Government will be host to this Congress, and FAO and other agencies are co-operating in its preparation. Previous Congresses took place in Rome, Italy, 1926; Budapest, Hungary, 1936; Helsinki, Finland, 1949; and Dehra Dun, India, 1954.

The purpose of this Congress, essentially technical in nature, is to advance the science and practice of forestry in its broadest sense, by providing an opportunity for the exchange of information and the development of ideas on a wide international scale. The provisional program, which was distributed recently, covers the entire range of forestry science in ten sections.

Under the section of forest protection, there will be sessions dealing with forest pathology and forest entomology, where the following topics will be discussed:

Forest pathology

1. Intercontinental spread of forest pathogens; significance of introduced diseases
2. New approaches to forest disease control
   - (*a*) Chemical control, including antibiotics
   - (*b*) Cultural control
   - (*c*) Present and potential significance of root rots in intensive forest management

Forest entomology

1. Chemical control of forest insects
   - (*a*) Aerial spraying, including side effects
   - (*b*) New approaches, including systemics
2. Biological control of forest insects
   - (*a*) The role of parasites and predators
   - (*b*) New approaches
3. Cultural control of forest insects

Weather and climate in forest protection

1. Climate and disease epidemics
2. Weather and insect epidemics

Under the section of forest products, the following aspects of wood preservation and protection will be discussed:

1. Penetration of chemicals into wood
2. New preservatives and treatment method
3. Status of biology and control of marine borers
4. Fungus and insect problems in storage and use of wood
5. Fireproofing of timber

Excursions will be arranged before and after the Congress to major forest regions of the United States, including Alaska.

In addition to official delegates of countries, participation in the Congress will be open to private persons or technicians interested in forestry, forest conservation, forest recreation and forest industry. For further information enquiries should be addressed to: Mr. I.T. Haig, Executive Secretary, Organizing Committee, Fifth World Forestry Congress, Department of State, Washington 25, D.C., U.S.A.

GRASSES IN AGRICULTURE

FAO Agricultural Studies No. 42

A global review of the adaptation, management, improvement and utilization of cultivated grasses in dryland and irrigated agriculture, this authoritative volume is based on information supplied by technicians from all parts of the world and on the wide personal experience of its authors. It indicates some problems of present concern to grass specialists and describes the methods being adopted to overcome them.

The agronomy of grasses is discussed in its relation to farm planning, soil fertility, land preparation, grazing, artificial fertilizers, and the production and distribution of seed. Biology, genera and species of grasses are also reviewed in some detail, including the physiology and local adaptation of grasses, plant introduction, selection and breeding, as well as the distribution and agricultural value of certain species.

In addition to numerous references for further reading on the subject of grass agronomy, this publication includes a full glossary of bibliographical titles and an index of subject and botanical names. A table of conversion factors also appears for reader reference.

Available at FAO, Rome, Italy, or from local sales agents. English (clothbound), French and Spanish editions.

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